REMARKS

This amendment is submitted pursuant to the recent interview courteously granted to the Applicant's attorney by Examiners Fourson and Estrada in connection with the above-identified application. The Applicant's attorney expresses his appreciation for the careful attention paid by the Examiners to the proposed amendments and arguments discussed during the course of the interview. The following remarks include the substance of the comments made during the interview.

By this amendment claim 1 has been revised in the manner agreed at the interview to distinguish from the prior art relied upon in the latest Examiner's Action. As amended, claim 1 is directed to a process for fabricating a semiconductor device having a buried layer and it requires the steps of forming a buried implanted region at a location which is spaced below a surface of a substrate where a buried layer is to be formed in the substrate and placing the substrate inside a reactor furnace and, while maintaining the substrate in the reactor furnace, providing a non-oxidizing atmosphere in the furnace, annealing the substrate to activate implanted impurity ions and diffuse the buried implanted impurity region both upwardly and downwardly from the location below the surface of the substrate while increasing the internal temperature of the reactor furnace up to a first temperature and, before the buried ion implanted region beneath the surface of the substrate expands upwardly sufficiently to reach the surface of the substrate, changing the internal temperature of the furnace from the first temperature to a second temperature at which an epitaxial crystal starts to grow on the surface and introducing an epitaxial growth gas into the reactor furnace to cause an epitaxial layer to grow on the surface of

the substrate, thereby inhibiting autodoping and formation of crystal defects in the epitaxial layer, and then removing the substrate from the reactor furnace.

With this arrangement as described in the specification, a buried layer can be produced in a semiconductor substrate while avoiding autodoping of a subsequently formed epitaxial layer and formation of crystal defects in the epitaxial layer.

As discussed at the interview, the Yoshida et al. Patent No. 4,295,898, which is the only reference relied upon in support of the rejection, does not disclose or suggest forming a buried implanted impurity ion region at a location which is below the surface of the substrate. Instead, Yoshida et al. implant impurity ions only at the surface of the substrate and rely upon evaporation of ions from the surface of the substrate together with downward diffusion of the ions into the substrate to produce a buried layer. While this is effective with aluminum ions it is not effective with boron ions, for example, and moreover requires the substrate to be exposed to high temperature conditions for a lengthy period of time in order to produce the buried layer as described, for example at column 3, lines 36-40. Accordingly, Yoshida et al. do not disclose or suggest forming a buried implanted region at a location which is spaced below a surface of the substrate as required by claim 1. Therefore, as agreed at the interview, claim 1 as amended is patentable over Yoshida et al. Furthermore, we respectfully submit that claim 1 is patentable over all of the other prior art and that the application should be allowed.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show**

changes made." In view of the foregoing, this application is now believed to be in condition for formal allowance. Further and favorable action is respectfully requested.

Respectfully submitted,

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<u>**VERSION WITH MARKINGS TO SHOW CHANGES**</u>

<u>In the Claims</u>:

<u>Claim 1 has been amended in the following manner</u>:

--1. (Twice Amended) A process for fabricating a semiconductor device having a buried layer comprising the steps of:

[implanting an] <u>forming a buried implanted</u> impurity ion region <u>at a location which is spaced</u> below a surface of a substrate where a buried layer is to be formed in the substrate;

placing the substrate inside a reactor furnace <u>and, while maintaining the substrate in the reactor furnace</u>;

providing a non-oxidizing atmosphere inside of the reactor furnace;

annealing the substrate to activate <u>implanted impurity ions</u> and diffuse the <u>buried</u> implanted impurity ion region <u>both upwardly and downwardly from the location below the surface of the substrate</u> while increasing the internal temperature of the reactor furnace up to a first temperature; and

before the <u>buried</u> ion implanted region beneath the surface of the substrate expands <u>upwardly</u> sufficiently to reach the surface of the substrate, changing the internal temperature of the reactor furnace from the first temperature to a second temperature at which an epitaxial crystal starts to grow on the surface and introducing an epitaxial growth gas into the reactor furnace to

cause an epitaxial layer to grow on the surface of the substrate, thereby inhibiting autodoping and formation of crystal defects in the epitaxial layer; and

then removing the substrate from the reactor furnace.--